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NATIONAL LIBRARY of MEDICINE NEWS

Published for institutions and individuals interested in health sciences communications.

Phase II of Visible Human Project Completed

"Sharper" *Visible Woman* Joins Male Counterpart on the Internet

An anonymous 59-year-old Maryland woman who donated her body to science is now immortalized on the Internet as the Visible Woman, completing the second phase of NLM's Visible Human Project. This news was hailed by the national news media and the international scientific community as another milestone in the ongoing attempt to better understand the workings of the human body.

The Visible Man (left) and Visible Woman, shown above in vertical cross sections, together constitute some 55 gigabytes of data that is available via the Internet or on magnetic tape from NLM.

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Furlough-Blizzard Issue

As most of you know, the National Library of Medicine was seriously affected by the three-week Government furlough and the blizzard that hit the Eastern U.S. We had to close our doors to patrons, but we attempted to maintain round-the clock MEDLINE services to doctors and scientists around the world with a tiny emergency crew. As NLM Director **Donald A. B. Lindberg,** M.D., commented during the furlough, "Essentially, we have put the computers on automatic pilot and crossed our fingers that no interruptions or failures occur." The furlough ended the first week of January, only to be followed by a record-breaking blizzard that essentially closed NLM's operations through mid-January.

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NATIONAL LIBRARY of MEDICINE NEWS

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The Secretary of Health and Human Services has determined that the publication of this bimonthly periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1996.

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1984, effective with Vol. 43, No. 6-7.

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The three-dimensional, computer-generated female "cadaver" joined her male counterpart during the 81st Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA) on November 28. The Visible Man was released during the 1994 RSNA meeting (*News,* November-December 1994).

The Visible Woman will give viewers an incredibly detailed depiction of how the body works. While both databases were created from thousands of images of a male and a female body collected with state-of-the-art radiographic and photographic techniques, the Visible Woman's resolution is three times sharper than the male cadaver.

"We demanded more of our technology and ended up with a significantly higher resolution for the Visible Woman than we achieved for the Visible Man," said NLM Director **Donald A. B. Lindberg.**, M.D. "This is vital because the data can then be reformatted to show additional information with even more detail. Medical professionals can study the Visible Woman data to learn more about female anatomy, perform better surgical planning, continue training, and conduct research."

The Visible Human Project is managed and funded by the NLM, while the imaging and data assembly were carried out by researchers at the University of Colorado Health Sciences Center in Denver.

The donor body for the Visible Woman was imaged from head to toe using computed tomography (CT), magnetic resonance (MR) and x-rays. The body was embedded in a gelatin, frozen, and sliced crosswise into more than 5,000 slices, each one-third of a millimeter thick. A custom-made mechanical planing device—called a cryomacrotome—was used to slice the body in a technique developed by principal researchers **Victor Spitzer**, Ph.D., associate professor, Department of Radiology and Cellular and Structural Biology, and **David G. Whitlock**, M.D., Ph.D., professor, Department of Cellular and Structural Biology, University of Colorado Health Sciences Center.

"We are already seeing the impact of the data as a simulator to train medical professionals," said Dr. Spitzer. Students can interact with the data of the Visible Human to train and test procedures. Soon we will be able to reformat the database and change body characteristics. For example, kinetics researchers will be able to compare the 'normal' Visible Human's attributes to that of an Olympic runner and investigate what contributes to the athlete's superior ability."

The next phase of the project will be to label the Visible Man and Woman. "Right now, looking at them is like looking at a road map without street names," says **Michael J. Ackerman**, Ph.D., who is managing NLM's Visible Human Project with Dr. Lindberg. "We are already working on making this an 'intelligent' database by labeling each part of the body and incorporating descriptions of how the parts relate to each other." Dr. Ackerman is NLM assistant director for high performance computing and communications.

The Visible Woman and Man are available from the NLM over the Internet (at no charge) or on magnetic tape. Users must sign a licensing agreement stating how the information will be used. Although licensed users can download the anatomical information from the Internet, getting the entire 39 gigabytes that constitute the Visible Woman (or the 15 gigabytes that constitute the

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NLM's Master Serials System Reaches Two Milestones

The NLM Serial Records Section reached two milestones this fall in the development of its automated serials processing system. The 100,000th serial title was added to its Master Serials System on November 13. Earlier in the fall, a remote site entered a title into the system for the first time.

The Master Serials System, a series of electronic files, originated in the mid-1970's as one of

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A Myriad of Uses for the Visible Man

The Visible Man, since being released over the Internet a year ago, has been used in a variety of ways. Among the medical uses are:

• **Force Feedback Training:** Attendees at the recent RSNA meeting performed a needle insertion simulation using the Visible Man database. While attempting a lumbar puncture (the insertion of a needle into a space between two vertebrae) into a plastic model of a human back, users actually felt bones and muscles. This "force feedback" technique is guided by the Visible Man database.

• **Virtual Testing**: Researchers at the State University of New York, Stony Brook, are using the database to create a virtual colonoscopy simulator that could eliminate the need for the uncomfortable, invasive procedure that screens for colon cancer. Patients would need only a noninvasive computer tomography (CT) scan to be tested.

• **Anatomy:** "The Dissectable Human" was presented via CD-ROM and printed atlases by Engineering Animation, Inc., and Mosby.

• **Web Browser**: UNIX workstation users can use a data browsing and retrieval tool called Human Explorer, which was created through a collaboration between NLM and the University of Maryland.

• **Knee Knowledge**: The University of Pennsylvania has developed an Interactive Knee Program.

• **Radiation Reduction:** Researchers are using the Visible Man as a model to help improve patient treatment planning and reduce radiation absorption.

• **Curricula:** The Loyola University Stritch School of Medicine, Chicago, is Using Visible Human images in its anatomical curriculum; the Mallinckrodt Institute of Radiology, St. Louis, has created an educational tool for medical students; Smoky Hill High School, Smoky Hill, Colorado, is involved in a Visible Human Digital Anatomy Project.

Among non-medical uses of the Visible Man:

Artists: Several groups of artists have used the Visible Man as a model for their work. For example, a university in Japan is using the Visible Man as part of an exhibit of Leonardo da Vinci's art work. They rendered the database to mirror da Vinci's work to compare the differences in physique.

Furniture Building: Builders of ergonomic furniture are studying the Visible Man's range of motion to design more comfortable and supportive seating.

Mathematical Theorizing: The Visible Man data is being used by a group of mathematicians who are testing a theory of how to map three-dimensional objects.

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Visible Man) would take weeks of uninterrupted computer processing time. For most purposes, users access only portions of the anatomical information from the Internet; those who want the whole database get the information on magnetic tape supplied by the National Technical Information Service for a duplication fee. For further information, users can contact Dr. Ackerman via e-mail: ackerman@nlm.nih.gov. The Library also provides information about the project on HyperDoc, NLM's World Wide Web home page: *http://www.nlm.nih.gov* and in a fact sheet (see p. 14.) □

Dr. Siegel Elected AAAS Information and Computing Section Chair-Elect

Elliot R. Siegel, Ph.D., NLM associate director for health information programs development, has been elected chair-elect of the American Association for the Advancement of Science's Section on Information, Computing, and Communication. His three-year term of office runs through January 26, 1999. Dr. Siegel has been secretary of the AAAS Information and Computing Section since 1986.

Dr. Siegel, who began his career at NLM as an information scientist with the Lister Hill Center, is currently in charge of the office that directs NLM's outreach, planning and evaluation, and interna-

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the early applications of general database management system (DBMS) software to library processing. Today it controls all aspects of serials acquisitions for the NLM including ordering, payment and checkin of receipts. The system also helps manage journals routed for indexing in MEDLINE as well as document delivery and holdings data for more than 3100 biomedical libraries in the United States and Canada.

Data extracted from the Master Serials System are used to build SERLINE, a public MEDLARS file. SERLINE is used throughout the world to identify journals and other serials and to record information about those journals NLM indexes for the MEDLARS databases. SERLINE was first mounted on the ELHILL retrieval system in 1977. Two of NLM's publications, *List of Journals Indexed for Index Medicus* and the *List of Serials Indexed for Online Users*, are produced from SERLINE.

The Master Serials System originally contained bibliographic records for serial titles currently received at the NLM. In the mid 1980s, records for the entire collection of serials held at NLM, including ceased titles, were added to the file, bringing the total to over 60,000. Since that time all new titles acquired by the library have been entered into the file. The 100,000th title added to the file was *Contemporary Treatments in Cardiovascular Disease*, published by Chapman and Hall.

Bibliographic data in the Master Serials System includes not only titles that NLM acquires for its collection but also over 6600 titles held by other libraries in the National Network of Libraries (NN/LM) of Medicine, for which they wish to record holdings in SERHOLD, the national serials holdings database. Until recently, NLM has added all the records of titles owned by other libraries, based on bibliographic information they supply.

NLM serials librarian Kathrin McConnell added the 100,000th record—for *Contemporary Treatments in Cardiovascular Disease*, published by Chapman and Hall—to the Library's Master Serials System.

A pilot test to permit direct input by the regional SERHOLD coordinators was initiated this year to speed the input of the titles held only in NN/LM libraries. The Claude Moore Health Sciences Library at the University of Virginia is the beta test site for this project and is the first institution outside of NLM to add records directly online to the NLM Master Serials System. On October 18, staff at the health sciences library accessed the NLM file and created a record for *AAHM Newsletter*, a publication of the American Association for the History of Medicine. □

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tional programs. In his upcoming chairmanship at the AAAS, he will play a major role in planning new initiatives in connection with the Association's informatics and communications activities.

With more than 243,000 individual members and nearly 300 affiliated societies comprising some 10 million members, the AAAS is the world's largest general science organization. It also publishes the journal *Science*.

On February 11, Dr. Siegel and NLM Director **Donald A. B. Lindberg**, M.D., will be speaking at the session on "Health Research and Education: Information for the Next Century" at the AAAS annual meeting in Baltimore, Maryland. □

Retrospect of a Former NLM Director

News has recently been received of the death of Dr. ***Joseph H. McNinch*** *in St. Petersburg, Florida, on October 4, 1994, at the age of eighty-nine.*

A native of Indiana, Dr. McNinch entered the United States Army Medical Corps in 1930 after receiving his M.D. degree from Ohio State University. He went on to serve as an Army medical officer for thirty-two years. Following varied field and staff assignments, including World War II service in Europe, he went to Washington, D.C., where from 1945 to 1950 he was assigned as first Director and Editor-in-Chief of the unit in charge of planning and preparing the multi-volume medical history of World War II. Between 1946 and 1949 Dr. McNinch served also as Director of the Army Medical Library, the predecessor of NLM. During this assignment he met his second wife, Eleanor, who was the Library's chief of reference; she continues to live in Florida.

During the 1950s and early 60s, Dr. McNinch successively held a number of senior Army medical posts, among them, as Chief Surgeon of the U.S. Army Far East Command; Chief Surgeon of the U.S. Army, Europe; and Commanding General of the U.S. Army Medical Research and Development Command. He retired from the Army in 1962 with the rank of major-general but continued in medical administration up to 1971 in prominent non-military capacities. These included important positions with the American Hospital Association as well as that of Chief Medical Director of the U.S. Veterans Administration. He spent his last years with his wife in St. Petersburg.

* * * * *

Dr. McNinch came to the Army Medical Library as its Director without having had previous library training, but he went to considerable lengths to learn the workings of the institution. While he left routine operations to professional librarians, he made his mark as a highly capable administrator at a critical point in the Library's history. He initiated an overdue evaluation of the *Index Medicus* and instituted measures to ensure its issuance on a timely basis. He grappled effectively with the emerging legal and economic issues involved in microfilming and photocopying published materials. And he not only played a constructive role in discussions over the future cabinet placement of the Library but argued for its eventual physical relocation in Bethesda.

Dr. Joseph McNinch

In addition to his term as Director, General McNinch served NLM once again, between 1963 and 1965, as a member of its Board of Regents. The Library owes much to the wisdom and dedication of this distinguished physician and Army officer.

——*James H. Cassedy*, History of Medicine Division

NLM Honor Awards Ceremony

The Library's annual honor awards ceremony, held November 8, saluted the achievements of individuals and groups throughout the Library.

The following employees received National Institutes of Health Merit Awards:

- **Joyce Backus,** Public Services Division, "for exceptional leadership and achievement in developing and maintaining automated systems for the Public Services Division and NLM."
- **Sally S. Burke**, Office of Administration, "in recognition of consistently excellent staff work provided in support of the Office of the Director, NLM, as well as her contributions to the administrative management functions of the National Library of Medicine."
- **Peter A. Clepper,** Extramural Programs, "for superb professionalism in bringing critical new extramural programs to fruition expeditiously and with commendable ingenuity."
- **George F. Hazard, Jr.**, Specialized Information Services, "for innovation and diligence in making chemical information available to the scientific community with easy-to-use retrieval methods and reasonable prices."
- **David L. Kenton**, Office of Computer and Communications Systems, "in recognition of his creative work in the design, development, and implementation of a proximity search capability for the MEDLINE Retrieval System."
- **Nancy E. Selinger,** Bibliographic Services Division,"for sustained contributions to enhancing the accuracy and quality of the MEDLINE database."

Acknowledgment was made of the following previously announced awards:

- *Phillip C. Coleman Award*: To **Melvin L. Spann**, Ph.D., Specialized Information Services, "for continuing leadership through mentoring, dedication and commitment to the overall goals of NLM."
- *EEO Special Achievement Award*: To **Kristine M. Scannel**, Public Services Division, "for her significant efforts to provide library services for NLM employees and persons with disabilities."
- *NIH Director's Award:* To **Robert B. Mehnert**, Public Information Office, "for outstanding effort in imaginatively and effectively communicating the mission of the National Library of Medicine," and to **Susan P. Buyer,** Office of Health Information Programs Development, "for her superior leadership in the development and management of the National Library of Medicine Long Range Plan."
- *NLM Director's Award:* To **Kenneth G. Carney,** Office of Administration, "for exceptional expertise in administrative management and for exemplifying the highest standards of public service"; to **Harold M. Schoolman,** M.D., Office of the Director, "for invaluable contributions to the research mission of the National Library of Medicine, and effective leadership of the Lister Hill National Center for Biomedical Communications"; and to **Ennis Wilson,** Office of Administrative Management Services, "for demonstrating exceptional initiative, skill, and knowledge in developing and directing a highly effective NLM property management program."
- *PHS Special Recognition Award:* To **Michael J. Ackerman,** Ph.D., National Coordination Office for High Performance Computing and Communications, "for innovative direction and leadership of NLM's pioneering electronic imaging research project, the Visible Human."
- *Board of Regents Award:* To **Jonathan A. Kans,** Ph.D., and **Gregory D. Schuler,** Ph.D., both of the National Center for Biotechnology Information, "for technical achievement contributing to the development of *Entrez,* an innovative information retrieval system that provides researchers worldwide with integrated access to the databases and literature of molecular biology."
- *Frank B. Rogers Award:* To **Peri L. Schuyler,** Medical Subject Headings Section, "for her exceptional contributions and leadership that have significantly improved the automation activities and expanded the scope of MeSH."

Over 135 employees were honored with individual and groups awards for sustained superior performance or for special acts or service. Sixty employees received length-of-service awards. □

Historical Exhibit Explores Medical Maps of Washington, D.C.

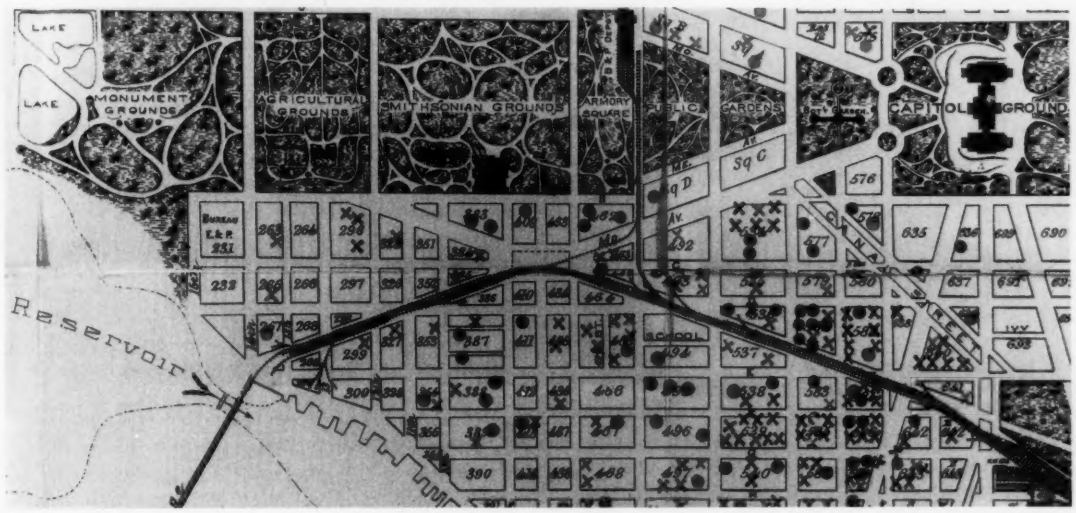
"Death and Disease in the Neighborhood: Medical Maps of Washington, D.C., 1878-1909" is a new exhibit on display from January 26 through April 25, 1996, in the National Library of Medicine's main lobby (Building 38).

The exhibit traces the evolution and publication of epidemiological maps of the U.S. capitol city from 1878 until 1909, when the public health officer of the District of Columbia discontinued their use in his annual report to the city's commissioners.

Displayed are maps mainly from the collections of the Library's History of Medicine Division. The central focus of the exhibit is the consistent use of maps in the annual *Report of the Public Health Officer of the District of Columbia* from 1878 until 1909 to chart numbers, locations, and the extent of human deaths from various diseases prevalent in Washington, D.C., and its suburbs as well.

Maps from other sources include one from the tenth census of the United States that accompanies *Vital Statistics of the District of Columbia and Baltimore* (1893). This work was authored by U.S. census expert, special agent **John Shaw Billings**, M.D., who was also in charge of the Army Medical Library (precursor to NLM) from 1867 to 1895. Another section of the exhibit displays earlier examples of how maps were used to communicate epidemiological information elsewhere. Also featured is a brief movie that provides a geographical history of Washington, D.C., with narration by **Richard W. Stephenson**, former head of the Library of Congress's Geography and Map Reading Room.

For further information on the exhibit, contact: **David Vecchioli**, History of Medicine Division, NLM; phone: 301-496-5405; Internet: *david_vecchioli@occshost.nlm.nih.gov.* □



Detail from: *Map of the City of Washington, showing location of fatal cases of lung diseases for the year ending June 30, 1892.* Each dot indicates a death from consumption; each "x" represents a death from pneumonia, bronchitis, or another acute lung disease.

NLM in Print

The following references cite works that discuss the products and services of the National Library of Medicine. If you know of other appropriate citations for this column, please send reprints or references to the editor, *NLM News*, National Library of Medicine, Bethesda, MD 20894. (Note: Some of the articles below may be from journals that are out of scope for the NLM collection and are therefore not available from the Library on interlibrary loan.)

Baxevanis AD, Landsman D. The Internet biologist [news]. FASEB J 1995 Aug;9(11):994.

Floyd NL. A new national library fuels the engine of education. Am Libr 1995 Nov;:1032-3.

Fonger GC. The Hazardous Substances Data Bank (HSDB) as a source of environmental fate information on chemicals. Toxicology 1995; 103(2):137-45.

Fuller S, Braude RM, Florance V, Frisse ME. Managing information in the academic medical center: building an integrated information environment. Acad Med 1995 Oct;70(10):887-91.

Lawrence RC, Pillemer S, Murphy R, Ostchega Y, Thoma GR, Long LR, Berman LE. Computer and Internet access to a national population sample of radiographic images of neck and lumbar spine. Arthr Rheum 1995;38(9):s385.

Locatis C. Deciding among interactive multimedia technologies. J Biocommun 1995;22(2):2-7.

Mahoney MC, Michalek AM. A bibliometric analysis of cancer among American Indians & Alaska Natives, 1966-1993. Alaska Med 1995 Apr-Jun;37(2):59-62, 77.

Ostell JM. Integrated access to heterogeneous data from NCBI. IEE Engin Med Biol. 1995 Nov-Dec;:730-6.

Pope J. The Visible Man: murderer becomes medical model. Times-Picayune (LA) 1995 Oct 31;:A1, A5.

Rowlands J, Morrow T, Lee N, Millman A. ABC of medical computing. Online searching. BMJ 1995 Aug 19;311(7003):500-4.

A History of Medical Informatics in the U.S., 1950 to 1990

This new work, published by the American Medical Informatics Association (AMIA), was prepared under a National Library of Medicine contract by NLM scholar-in-residence **Morris F. Collen**, M.D. Dr. Collen, a well-known and highly respected figure in the discipline, is Director Emeritus of the Division of Research at the Kaiser Permanente Medical Care Program. This first volume of Dr. Collen's history focuses on the systems that have been applied most directly to patient care. From the foreword by NLM Director **Donald A. B. Lindberg,** M.D.: "With the whole-hearted cooperation of his colleagues, [Dr. Collen] has produced a richly detailed account of how Medical Informatics came into being and attracted a cadre of immensely talented true believers who, frequently with little support from their institutions, dedicated themselves to the task of applying rapidly evolving computer and communications capabilities to medicine." Copies may be ordered from AMIA (4915 St. Elmo Ave., Suite 401, Bethesda, MD 20814); $38 (members); $43 (nonmembers); price includes domestic postage/handling. □

Thoma GR, Berman LE, Long LR. Internet access to a biomedical text/x-ray image databank. Proc 19th International Online Meeting. Oxford: Learned Information Europe Ltd, 1995; 429-35.

Waldrop MM. On-line archives let biologists interrogate the genome [news]. Science 1995 Sep 8;269(5229):1356-8.

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Publications

CAIM Ceases with 1994 Cumulation

NLM has announced that its *Cumulated Abridged Index Medicus* will cease effective with Volume 25, the cumulation of the 1994 issues of the monthly *Abridged Index Medicus*. A cumulation of the 1995 issues will not be published.

The *Abridged Index Medicus* was initiated in 1970 to "afford rapid access to selected biomedical journal literature of immediate interest to the practicing physician." A subset of citations from approximately 119 English-language clinical journals was selected for AIM. Although today it is becoming increasingly difficult to select a core of journals that meets the needs of the practicing physician, this publication has been of value to the community over the years. In the past two decades over two thousand libraries, clinics, colleges, public libraries, and individuals, including libraries in the depository program, have subscribed to the monthly issues and the annual cumulations.

There are several reasons for discontinuing this publication. First, during the past 20 years, increasing numbers of subscribers have been accessing the MEDLINE database directly and therefore subscriptions are declining. Searching MEDLINE provides a much more efficient and effective way to identify citations relevant to one's information needs and is more cost effective for most users. For example, for the cost of the annual volume, a user could perform approximately 45 Grateful Med searches. And secondly, since there are many demands on scarce Federal dollars, the National Library of Medicine must make some difficult choices between continuing to support existing products and improving or developing new products to meet the needs expressed by health sciences librarians and health professionals.

NLM Associate Director for Library Operations, **Lois Ann Colaianni,** said recently, "I realize that some find this publication particularly useful, and I would be happy to explore alternative sources for this information with such individuals. Please contact me at 301/496-6921, *loisann@nlm.nih.gov,* or by mail."

This decision does not affect the monthly *Abridged Index Medicus* for 1996. Nor does it affect the unabridged *Cumulated Index Medicus* (see below).

CIM 1995

As we go to press, GPO has announced a price of **$379** ($496.25 foreign) for the 17-volume *Cumulated Index Medicus,* Vol. 36, 1995, scheduled to appear in May 1996; the stock number is 617-052-00310-4.

New Current Bibliography on Cardiovascular Health

NLM's Reference Section produces a series of bibliographies covering distinct subject areas of current interest to the biomedical community. The latest, on physical activity and cardiovascular health, is available from the Government Printing Office (see below).

Current Bibliographies in Medicine (CBM95) series subscriptions are available for **$47** ($58.75 foreign) or individually for **$4.75** ($5.94 foreign). A list of available titles appears in each monthly issue of *Abridged Index Medicus* and *Index Medicus.* Mail orders to: New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. GPO Phone Orders: 202/783-3238. Recent CBMs are also accessible through FTP.

• CBM 95-7 *Physical activity and cardiovascular health.* January 1990 through September 1995. 1,966 citations. [S/N 817-011-00007-1] □

From p. 8

Waldrop MM. The Visible Man steps out. Science. 1995 Sep 8;269(5229):1358.

Whalen TV. The National Library of Medicine computer resources: your tax dollars at work. Current Surg 1995 Jul-Aug;52(6):324-6.

Zelingher J. HyperDOC [news]. MD Comput 1995 May-Jun;12(3):169,171. □

NLM Grant Awards—Fiscal Year 1995

The Library has a number of grant programs which are made available under the authorities of Public Health Service laws. New grant awards for fiscal year 1995 are listed below. The dollar amounts shown represent the current (first year) awards and are only a portion of the total in the case of a multiple-year total project period. Further information on NLM grants is available from Extramural Programs, National Library of Medicine, Bethesda, MD 20894; telephone: 301/496-4221.

Publication Grants

- Peter Baldwin, Ph.D. (University of California Los Angeles, Los Angeles, CA) *State Intervention Against Contagious Disease* $39,288
- Bernadine C. Barr, Ph.D. (Stanford University, Stanford, CA) *Spare Children—Subjects in Research, 1900-1945* $25,000
- Ann G. Carmichael, Ph.D. (Indiana University, Bloomington, IN) *History of State Registration of Causes of Death* $20,348
- Albert H. Teich, Ph.D. (American Association for the Advancement of Science, Washington, D.C.) *Videos on Scientific Research Integrity* $185,862
- Malcolm H. Hast, Ph.D. (Northwestern University, Chicago, IL) *Annotated Translation of Vesalius' Fabrica* $34,799
- Philippa J. Levine, Ph.D. (University of Southern California, Los Angeles, CA) *Venereal Disease and Imperial Policy—Britain 1860-1918* $30,711
- Ruth R. Faden, Ph.D. (Johns Hopkins University, Baltimore, MD) *Ethics & Allocation—Foundations of American Health Care* $33,000
- Leslie J. Reagan, Ph.D. (University of Illinois Urbana-Champaign, Champaign, IL) *When Abortion Was a Crime—Women, Medicine, and Law* $38,550
- Heather M. Prescott, Ph.D. (Central Connecticut State University, New Britain, CT) *Emergence of Adolescent Medicine* $33,195
- Carla J. Funk (Medical Library Association, Chicago, IL) *History of the Medical Library Association* $14,300
- MaryEllen C. Sievert, Ph.D. (University of Missouri Columbia, Columbia, MO) *Missouri Thesaurus of Medical Informatics Terminology* $36,293
- Richard A. Rettig, Ph.D. (Rand Corporation, Santa Monica, CA) *Public Policy and the Treatment of Kidney Failure* $43,960
- Ann G. Hess, M.D. (Harvard University, Boston MA) *Women Healers and Female Health in Puritan America* $44,975
- Ruth Leys, Ph.D. (Johns Hopkins University, Baltimore, MD) *Western Concepts of Psychic Trauma, 1875-1995* $25,000

Biotechnology Information Research Grants

- William R. Pearson, Ph.D. (University of Virginia, Charlottesville, VA) *Comparison of Protein Sequences and Structures* $211,523
- Daniel B. Davison, Ph.D. (University of Houston-University Park, Houston TX) *Multiple Sequence Alignment of Server and Algorithm Development* $181,811
- Ross C. Hardison, Ph.D. (Pennsylvania State University, University Park, PA) *Network Server for Electronic Genetic Analysis* $217,340

Medical Informatics Research Grants

- Eta S. Berner, Ed.D. (University of Alabama at Birmingham) *Physician Use of Diagnostic Decision Support System Data* $35,299
- Roger W. Jelliffe, M.D. (University of California at Los Angeles) *New Decision Supports and Databases for Drug Dosage* $412,029
- Colin B. Begg, Ph.D. (Sloan-Kettering Institute for Cancer Research, New York, NY) *Meta Analysis Methodology for Diagnostic Test Evaluation* $88,410
- Lawrence E. Widman, M.D. (University of Oklahoma Health Sciences Center, Oklahoma City, OK) *Knowledge-Based Interpretation of Cardiac Arrhythmias* $166,321

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- Andrew Balas, M.D. (University of Missouri, Columbia, MO) *Meta Analysis of Clinical Information Service Trials* $93,481
- Harry P. Selker, M.D. (New England Medical Center Hospitals, Inc., Boston, MA) *New Mathematical Models for Medical Events* $251,015
- Arthur W. Toga, Ph.D. (University of California at Los Angeles) *Digital Representation and Visualization of Human Brain* $216,253
- Robert S. Hayward, M.D. (McMaster University, Hamilton, Canada) *Evaluation of a Database of Practice Guideline Abstracts* $171,433
- Mark A. Musen, M.D. (Stanford University, Stanford, CA) *Software Architecture for Guideline Directed Therapy* $319,790
- Michael H. Goldbaum, M.D. (University of California at San Diego) *Structured Analysis of the Retina* $274,013
- Bonnie L. Webber, Ph.D. (University of Pennsylvania, Philadelphia, PA) *Effective Information Delivery to Clinical Personnel* $251,080
- Sartaj K. Sahni, Ph.D. (University of Florida, Gainesville, FL) *Algorithms for Compression and Registration of Brain MRI* $269,252

Medical Informatics Research Fellowship

- John C. McEachen, Ph.D. (Yale University, New Haven, CT) *Statistical Fusion of Multimodal Neurologic Images* $25,608

Applied Medical Informatics Fellowship

- Andreas M. Kogelnik (Emory University, Atlanta, GA) *Mitochondrial Genetics Information System* $14,508

Conference Grant

- Russ B. Altman, M.D. (Stanford University, Stanford, CA) *Intelligent Systems for Molecular Biology 1995* $13,000

Electronic Medical Records System Cooperative Agreements

- Guy O. Barnett, M.D. (Massachusetts General Hospital, Boston, MA) *Point of Care Computer Based Ambulatory Patient Record* $386,676
- William R. Hersh, M.D. (Oregon Health Sciences University, Portland, OR) *Vocabulary and Text Data Extraction from the EMR* $375,570

Research Resource Grants

- Temple Smith, Ph.D. (Boston University, Boston, MA) *Biomolecular Engineering Research Center* $732,251
- Robert S. Ledley, D.D.S., National Biomedical Research Foundation, Washington, D.C.) *Protein Information Resource* $1,048,211
- Richard J. Roberts, Ph.D. (New England Biolabs, Inc., Beverly, MA) *Rebase—the Restriction Enzyme Database* $143,929

Academic Research Enhancement Award

- Ronald E. Mandsager (Oklahoma State University at Stillwater, Stillwater, OK) *Computer-Based Fuzzy Monitoring of Infusion Anesthesia* $88,762

FIRST (First Independent Research Support and Transition) Awards

- Paul N. Gorman, M.D. (Oregon Health Sciences University, Portland, OR) *Information Seeking in Primary Care* $100,056
- Yiming Yang, Ph.D. (Mayo Foundation, Rochester, MN) *LLSF Mapping for Indexing and Retrieval of MEDLINE* $120,129
- Richard A. Goldstein, Ph.D. (University of Michigan at Ann Arbor) *Computational Approaches to Protein Structure Prediction* $85,687
- Stephen B. Johnson, Ph.D. (Columbia University, New York, NY) *Access to Medical Information through Natural Language* $114,933

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Small Business Innovative Research Grant

- John Nelson, M.D. (Nelson Information Systems, Inc., Bethesda, MD) *Advanced Pilot Study of a Journal Management System* $387,854

Health Sciences Librarian Education & Training Planning Grants

(Total awarded: $500,506)

- Kerryn A. Brandt, Ph.D., Johns Hopkins University School of Medicine, Baltimore, MD
- Thomas Detre, M.D., University of Pittsburgh, Pittsburgh, PA
- Linda Smith, Ph.D., University of Illinois, Champaign, IL
- Fred W. Roper, Ph.D., University of South Carolina, Columbia, SC
- Nunzia B. Giuse, M.D., Vanderbilt University Medical Center, Nashville, TN
- MaryEllen C. Sievert, Ph.D., University of Missouri, Columbia, MO
- Barbara Moran, Ph.D., University of North Carolina at Chapel Hill, Chapel Hill, NC

Information Access Grants

- Amanda Aguirre (Western Arizona Area Health Education Center, Yuma, AZ) *WAMLC Online Modernization Program* $101,097
- Pamela M. Reynolds (Southwest Georgia Area Health Education Center, Albany, GA) *SOWE-GA Information Delivery Electronic Access-IDEA #2* $74,021
- Pamela M. Reynolds (Southwest Georgia Area Health Education Center, Albany, GA) *SOWE-GA Info Delivery Electronic Access-IDEA #3* $86,577
- Frieda Liem (Pennsylvania State Department of Public Welfare, Harrisburg, PA) *Technology for Immediate Access to Health Information* $61,099
- Janice Perlman-Stites (Hospital Consortium of San Mateo County, Burlingame, CA) *Multiple User Access to Online Union Catalog* $59,608
- Evelyn L. Simpson (Bear Valley Community Hospital District, Big Bear Lake, CA) *Bear Valley Community Hospital Medical Library Online* $12,000
- Tracy K. Notarius (Western New York Library Resources Council, Buffalo, NY) *WNY Circuit Hospitals Information Access Project* $75,287
- Anne S. Goss (Ohio University, Athens, OH) *End-User Health Information Retrieval* $65,036
- Phyllis C. Self, Ph.D. (Virginia Commonwealth University, Richmond, VA) *Southside Health Information Consortium Access Grant* $89,970
- Sheila M. Hayes (William W. Backus Hospital, Norwich, CT) *Professional/Public Information Increased Access Grant* $11,121

Information Systems Grants

- Gary W. Kearl, M.D. (University of Kentucky, Lexington, KY) *Information for Medical Students in Ambulatory Practice Sites* $79,076
- Sharon E. Dennis (University Of Utah, Salt Lake City, UT) *Model Multimedia Support Center for the Health Sciences* $200,285
- Roberta A. Oppenheim (Forsyth Dental Center, Boston, MA) *Oral Health Sciences Information System (OHSIS)* $191,640
- Mignon S. Adams (Philadelphia College of Pharmacy-Science, Philadelphia, PA) *Electronic Pharmacy Library* $99,524
- Phyllis C. Self, Ph.D. (Virginia Commonwealth University, Richmond, VA) *Drug Information Automated Library (DIAL)* $148,413
- Judith R. Messerle (Harvard University, Boston, MA) *Creation of a Knowledge Laboratory* $216,422

Integrated Advanced Information Management Systems Grants

- William W. Stead, M.D. (Vanderbilt University, Nashville, TN) *Fast Track Provision of IAIMS* $550,000
- John A. Paton, Ph.D. (Yale University, New Haven, CT) *IAIMS Implementation* $546,561

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- Richard E. Ward, M.D. (Case Western Reserve University-Henry Ford Health System, Detroit, MI) *Planning a Comprehensive IAIMS Capable of Supporting CQI* $148,629

Internet Connections Grants

(Total awarded: $908,056)

- Cathy M. Perley, St. Luke's Regional Medical Center, Sioux City, IA
- Carole Gilbert, Providence Hospital, Southfield, MI
- Jane C. Buch, Kettering Medical Center Foundation, Kettering, OH
- Irving Freeman, Ph.D., Mercy Hospital of Pittsburgh, Pittsburgh, PA
- Jane Howell, Montana State University - Billings, Billings, MT
- Estelle M. Goodell, Ph.D., Mary Imogene Bassett Hospital, Cooperstown, NY
- James C. Kotis, III, University of South Alabama, Mobile, AL
- Debra C. Rand, Long Island Jewish Medical Center, New Hyde Park, NY
- Charles W. Van Way, M.D., Saint Luke's Hospital, Kansas City, MO
- Sally H. Cavanaugh, Ph.D., York Health System, York, PA
- Jocelyn A. Rankin, Ph.D., Mercer University, Macon, GA
- Elliott S. Grossman, Ph.D., Mount Sinai Medical Center, Miami Beach, FL
- Donald A. Boudreau, Ph.D., Louisiana State University Medical Center, New Orleans, LA
- Donald R. Forgue, M.D., The Children's Mercy Hospital, Kansas City, MO
- Jeffrey F. Kenny, Lake Erie College of Osteopathic Medicine, Erie, PA
- R. Stephen Hunter, Legacy Emanuel Hospital and Health Center, Portland, OR
- Kappie A. Mumphrey, Baton Rouge General Medical Center, Baton Rouge, LA
- Randolph A. Miller, M.D., Vanderbilt University Medical Center, Nashville, TN
- John T. Heard, Ph.D., Kirksville College of Osteopathic Medicine, Kirksville, MO
- Mark F. Guagliardo, Ph.D., Children's Research Institute, Washington, D.C.
- Gerald B. Holzman, M.D., American College of OB/GYN, Washington, D.C.
- Daniel J. Weidman, St. John Mercy Health System, St. Louis, MO
- Dale F. Nordenberg, M.D., Egleston Children's Hospital, Atlanta, GA
- Patricia Hamilton, Rapid City Regional Hospital, Rapid City, SD
- Mark E. Notman, Ph.D., Michigan State University, East Lansing, MI □

Monograph & Serial Gaps

NLM regularly seeks the help of the medical library community in filling gaps in its monograph and serial collections. If you can provide any of these items we would be most grateful.

Monographs

If you are able to provide a copy of any of the monographs listed below, please send to:

National Library of Medicine
TSD-MONOGRAPHS Attn: L. Turnage
Bethesda, MD 20894

Hayes, David L. Dictionary of cardiac pacing, electrophysiology, and arrhythmias. Miami Lakes, Fla., : Peritus Corp., c1993.

Healers in the night. Eric de Rosny ; translated from the French by Robert Barr. Maryknoll, N.Y. : Orbis Books, c1985.

Lauritsen, John. Death rush : poppers & aids. New York : Pagan Press, c1986.

Serials

Please adddress serial issues to:

National Library of Medicine
TSD-GAPS Attn: C. Fields
Bethesda, MD 20894

AADE Editors Journal 1:1,3, 1974;2:2-3, 1975;3:1,3, 1976;4, 1977;5, 1978;7:2, 1980

Cont. p. 16

NATIONAL INSTITUTES OF HEALTH
NATIONAL LIBRARY OF MEDICINE
FACT SHEET
A World of Knowledge for the Nation's Health
December 1995

THE VISIBLE HUMAN PROJECT

Background

The Visible Human Project has its roots in a 1986 long-range planning effort of the National Library of Medicine (NLM). It foresaw a coming era where NLM's bibliographic and factual database services would be complemented by libraries of digital images, distributed over high speed computer networks and by high capacity physical media. Not surprisingly, it saw an increasing role for electronically represented images in clinical medicine and biomedical research. It encouraged the NLM to consider building and disseminating medical image libraries much the same way it acquires, indexes, and provides access to the biomedical literature. As a result of the deliberations of consultants in medical education, the long-range plan recommended that the NLM should "...thoroughly and systematically investigate the technical requirements for and feasibility of instituting a biomedical images library."

Early in 1989, under the direction of the Board of Regents, an ad hoc planning panel was convened to explore in-depth the proper role for the NLM in the rapidly changing field of electronic imaging. After much deliberation, the NLM Planning Panel on Electronic Image Libraries made the following recommendation in their report: "NLM should undertake a first project building a digital image library of volumetric data representing a complete, normal adult male and female. This Visible Human Project will include digitized photographic images for cryosectioning, digital images derived from computerized tomography and digital magnetic resonance images of cadavers." [The report is available from the Library's Public Information Office.]

Initial Aim

The initial aim of the Visible Human Project is the acquisition of transverse CT, MRI and cryosection images of a representative male and female cadaver at an average of one millimeter intervals. The corresponding transverse sections in each of the three modalities are to be registered with one another. A contract for acquisition of these pixel-based data was awarded in August 1991 to the University of Colorado at Denver. Victor M. Spitzer, Ph.D. and David G. Whitlock, M.D., Ph.D. are the principal investigators.

The Visible Human Male data set consists of MRI, CT and anatomical images. Axial MRI images of the head and neck and longitudinal sections of the rest of the body were obtained at 4 mm intervals. The MRI images are 256 pixel by 256 pixel resolution. Each pixel has 12 bits of grey tone resolution. The CT data consists of axial CT scans of the entire body taken at 1 mm intervals at a resolution of 512 pixels by 512 pixels where each pixel is made up of 12 bits of grey tone. The axial anatomical images are 2048 pixels by 1216 pixels where each pixel is defined by 24 bits of color, about 7.5 megabytes. The anatomical cross-sections are also at 1 mm intervals and coincide with the CT axial images. There are 1871 cross-sections for each mode, CT and anatomy. The complete male data set is 15 gigabytes in size

The Visible Human Female data set has the same characteristics as the male cadaver with one exception. The axial anatomical images were obtained at 0.33 mm intervals instead of 1.0 mm intervals. This has resulted in over 5,000 anatomical images. The data set is about 40 gigabytes in size. The spacing in the "Z" direction was reduced to 0.33 mm in order to match the 0.33mm pixel spacing in the "XY" plane. This will enable developers who are interested in three-dimensional reconstructions to work with cubic voxels.

Internet Access

Sample full scale images are available via NLM's FTP site: (nlmpubs.nlm.nih.gov). Six full color anatomical images and an explanatory README file can be found on the FTP site in (visible/bitmaps/color24) as (*.raw). Please be careful as each of these images is over 7 megabytes in size. Ten CT scan images and an explanatory README file can be found in (visible/bitmaps/ct) as (*.fre) (5 images captured while the cadaver was fresh) and (*.fro) (5 images captured after the cadaver was frozen). Six MRI scan images and an explanatory README file can be found in (visible/bitmaps/mri) as (*.t1).

Scaled down versions of all of these image files can be found on NLM's FTP site in (visible/gifs) as (*.gif) and on the NLM Gopher, (gopher.nlm.nih.gov), in the Vis-

ible Human Project section. On the world wide web, (http://www.nlm.nih.gov), the images can be found on the Research Projects page, in the Visible Human Project section, as (*.jpg).

License Agreement

A license agreement for use of either of the Visible Human Project data sets is required and it can be retrieved from NLM's gopher site. It is located in the section entitled Visible Human Project as a text file and as a downloadable WordPerfect file and it is also available from NLM's FTP site. The agreement will be found in section "visible" as a WordPerfect file, (vhpagree.wp), or as a text file, (vhpagree.txt). Two original signed copies of the agreement and a statement explaining your intended use of the data set are required. Send both signed copies of the agreement and the "use" statement to NLM's Visible Human Project office. The agreement will be signed by NLM and one of the originals returned to you along with your account and password to the Visible Human Project Internet FTP site, and information on purchasing the data set on 8 mm Exabyte or 4 mm DAT tape. The data set is being distributed from the FTP site and on tape in a Z-compressed UNIX TAR format. For the Visible Human Male data set, there are 6 tapes of anatomical images corresponding to 6 body regions: head, thorax, abdomen, pelvis, thighs, and feet. A 7th tape contains all the MRI and CT images. Each tape costs $150 in the US, Canada and Mexico, $300 elsewhere. An 8th, "sample," tape containing anatomical images from the entire body at 1 cm increments is also available. The set of 8 tapes costs $1,000 in the US, Canada and Mexico, $2,000 elsewhere. Contact the Visible Human Project's office for details of the tape distribution of the Visible Human Female data set.

Long-term Goal

The larger, long-term goal of the Visible Human Project is to produce a system of knowledge structures which will transparently link visual knowledge forms to symbolic knowledge formats. Methods need to be developed to link image data to symbolic text-based data which is comprised of names, hierarchies, principles and theories. Standards do not currently exist for such linkages. Generalizable methods like the use of hypermedia where words can be used to find pictures, and pictures can be used as an index into relevant text are under experimentation. Basic research is needed in the description and representation of structures, and the connection of structural-anatomical to functional-physiological knowledge. The goal is to make the print library and the image library a single, unified resource for medical information.

For additional information on the Visible Human Project contact:

Visible Human Project
National Library of Medicine
8600 Rockville Pike
Bethesda, MD 20894
FAX: (301) 402-4080
Internet: vhp@nlm.nih.gov

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AHA News 23:1-2, 1987;29:31, 1993

Alabama Medicine 63:7, 1994

Alternative Methods in Toxicology 9, 1993;10, 1994

ASAIO Journal 40:3, 1994

Biotechnology Techniques 8:2, 1994

BIR Report 23, 1992;24, 1993;25, 1994

British Dental Journal 165:9-10, 1988;176:3, 1994

Bulletin de l Academie Nationale de Medecine 164:10-12, 1980

Comparative Biochemistry and Physiology. Biochemistry and Molecular Biology 107:1-2, 1994

Comparative Biochemistry and Physiology. Comparative Physiology 106:3, 1993;107:1, 1994

Comparative Biochemistry and Physiology. Pharmacology, Toxicology and Endocrinology 107:1, 1994

Developmental Medicine and Child Neurology. Supplement 69, 1993

Dimensions of Critical Care Nursing 1:2-3,5, 1982;2:5, 1983

Environmental Health Perspectives 102:6-7, 1994

Equine Veterinary Journal 26:2-4, 1994

European Journal of Rheumatology and Inflammation 10:2, 1990;11:1, 1991;12:1, 1992;12:3, 13:2-4, 1993

International Reviews of Immunology 5:2, 1989

Journal of the Royal Army Medical Corps. 140:1-3, 1994

Leprosy Review 65:3, 1994

Molecular and Cell Biology of Human Diseases Series 4, 1994

Molecular Ecology 1:4, 1992

Nuclear Medicine and Biology 21:1-8, 1994

Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences 179, 1888;344:1307, 1994

Seminars in Oncology 21, 1994

Structure 1:3, 1993

Trends in Genetics 8:7, 1992 □

Furlough, from p. 1

During the month, new users could not be added, and the pipeline of records for MEDLINE would have been totally depleted had the closing continued through the end of January. NLM's Regional Medical Libraries, fortunately, continued to provide service, but the Library's own interlibrary loan activities (normally averaging almost 5,000 requests a week) had to stop except for emergency requests.

We are now funded through the end of this fiscal year, so Library employees (and patrons alike) are breathing easier, knowing NLM will be exempt from future Government shut-downs—at least until the end of September 1996. We are glad to be back in service and appreciate your patience during this most unusual situation.

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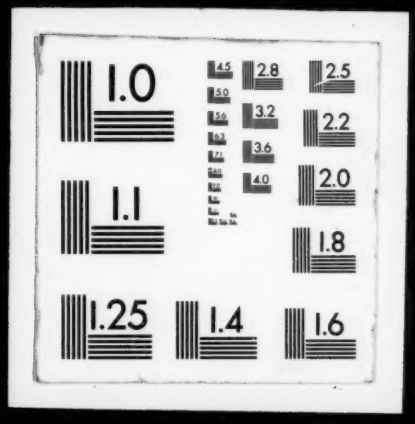
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